

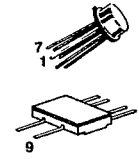
# 2N4937 thru 2N4939

CASE 654-07  
STYLE 1

## 2N4941

CASE 610A-04  
STYLE 1

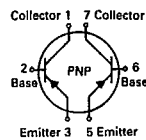
DUAL  
AMPLIFIER TRANSISTORS  
PNP SILICON



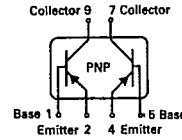
Refer to MD3250.A for graphs.

### PIN CONNECTION DIAGRAMS

CASE 654-07  
STYLE 1



CASE 610A-04  
STYLE 1



### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CE0}$	40	Vdc
Collector 1 to Collector 2 Voltage Voltage Rating and Lead to Case	$V_{C1C2}$	$\pm 200$ $\pm 200$	Vdc
Collector-Base Voltage	$V_{CBO}$	50	Vdc
Emitter-Base Voltage	$V_{EBO}$	5.0	Vdc
Base Current	$I_B$	10	mA
Collector Current — Continuous	$I_C$	50	mA
		One Die	Both Die
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ — Ceramic Metal Can Derate above $25^\circ\text{C}$ — Ceramic Metal Can	$P_D$	250 500 1.5 2.9	350 600 2.0 3.4 mW mW/°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$ Metal Can	$P_D$	1.2 6.85	2.0 11.42 Watts mW/°C
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +200	°C

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Voltage ( $I_C = 10\text{ mA}$ , $I_B = 0$ )	$V_{(BR)CEO}$	40	—	Vdc
Collector-Base Breakdown Voltage ( $I_C = 10\text{ }\mu\text{A}$ , $I_E = 0$ )	$V_{(BR)CBO}$	50	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 10\text{ }\mu\text{A}$ , $I_C = 0$ )	$V_{(BR)EBO}$	5.0	—	Vdc
Collector Cutoff Current ( $V_{CB} = 40\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	—	20	nA
Emitter Cutoff Current ( $V_{BE} = 3.0\text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	—	20	nA

### ON CHARACTERISTICS

DC Current Gain ( $I_C = 100\text{ }\mu\text{A}$ , $V_{CE} = 10\text{ Vdc}$ ) ( $I_C = 1.0\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ ) ( $I_C = 10\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ )	$h_{FE}$	40 50 50	200 250 250	—
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### SMALL-SIGNAL CHARACTERISTICS

Current-Gain — Bandwidth Product ( $I_C = 10\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	300	900	MHz
Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 140\text{ kHz}$ ) Emitter Guarded	$C_{cb}$	—	5.0	pF
Input Impedance ( $I_{BE} = 0.5\text{ Vdc}$ , $I_C = 0$ , $f = 140\text{ kHz}$ ) Collector Guarded	$C_{eb}$	—	10	pF
Input Impedance ( $I_C = 1.0\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )	$h_{ie}$	1.0	10	k $\Omega$
Voltage Feedback Ratio ( $I_C = 1.0\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )	$h_{re}$	—	10	$\times 10^{-4}$
Small-Signal Current Gain ( $I_C = 1.0\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )	$h_{fe}$	50	—	—
Output Admittance ( $I_C = 1.0\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )	$h_{oe}$	5.0	50	$\mu\text{mhos}$
Noise Figure ( $I_C = 100\text{ }\mu\text{A}$ , $V_{CE} = 10\text{ Vdc}$ , $R_S = 3.0\text{ k}\Omega$ , $f = 10\text{ Hz to }15.7\text{ kHz}$ )	NF	—	4.0	dB

MOTOROLA SMALL-SIGNAL TRANSISTORS, FETs AND DIODES

T-29-27

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
MATCHING CHARACTERISTICS				
DC Current Gain Ratio(1) (I <sub>C</sub> = 100 μAdc to 1.0 mAdc, V <sub>CE</sub> = 10 Vdc)	h <sub>FE1</sub> /h <sub>FE2</sub>	0.9 0.8	1.0 1.0	—
(I <sub>C</sub> = 100 μAdc to 1.0 mAdc, V <sub>CE</sub> = 10 Vdc, T <sub>A</sub> = -55°C to 125°C)		0.85 0.7	1.0 1.0	
Base-Emitter Voltage Differential (I <sub>C</sub> = 100 μAdc to 1.0 mAdc, V <sub>CE</sub> = 10 Vdc)	V <sub>BE1</sub> -V <sub>BE2</sub>	— —	3.0 5.0	mVdc
Base-Emitter Voltage Differential Gradient (I <sub>C</sub> = 100 μAdc to 1.0 mAdc, V <sub>CE</sub> = 10 Vdc, T <sub>A</sub> = 25°C to +125°C)	$\frac{\Delta(V_{BE1}-V_{BE2})}{\Delta T_A}$	— —	1.0 2.0	mVdc
(I <sub>C</sub> = 100 μAdc to 1.0 mAdc, V <sub>CE</sub> = 10 Vdc, T <sub>A</sub> = -55°C to 25°C)		— —	0.8 1.6	

(1) The lowest h<sub>FE</sub> reading is taken as h<sub>FE1</sub> for this ratio.